

Nordin, Martin

Working Paper

Does Eligibility for Tertiary Education Affect Crime Rates? Quasi-Experimental Evidence

Working Paper, No. 2014:14

Provided in Cooperation with:

Department of Economics, School of Economics and Management, Lund University

Suggested Citation: Nordin, Martin (2014) : Does Eligibility for Tertiary Education Affect Crime Rates? Quasi-Experimental Evidence, Working Paper, No. 2014:14, Lund University, School of Economics and Management, Department of Economics, Lund

This Version is available at:

<https://hdl.handle.net/10419/260111>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Working Paper 2014:14

Department of Economics
School of Economics and Management

Does Eligibility for Tertiary Education Affect Crime Rates? Quasi-Experimental Evidence

Martin Nordin

April 2014



LUND
UNIVERSITY

Does Eligibility for Tertiary Education Affect Crime Rates? Quasi-Experimental Evidence*

Martin Nordin

Department of Economics, Lund University, P.O. Box 7082, 220 07 Lund, Sweden

Martin.nordin@nek.lu.se

Abstract

This paper estimates a tertiary eligibility effect on crime for Sweden. The idea is that investment in higher education is a way of escaping youth inactivity and idleness, and, since youth inactivity is known to trigger crime, the self-incapacitation effect of higher education decreases crime rates. However, to invest in higher education, the individual has to meet the tertiary eligibility requirements in upper-secondary school. Tertiary eligibility may therefore affect crime rates. Evidence of an exogenous grade inflation in the eligibility rate is used to identify the tertiary eligibility effect. With the introduction of a goal-related grading system, the share with tertiary eligibility increased by more than 6 percentage points. Accordingly, during the period with grade inflation in the eligibility rate, crime rates fell, but, when the period of grade inflation was ended, the effect of tertiary eligibility on crime disappeared as well. Hence, when youth have the opportunity to invest in higher education, and thus escape unemployment or inactivity, their propensity to commit crime decreases.

JEL classification: J2, K14, K42

Key words: crime; education, tertiary eligibility

1. Introduction

Youth unemployment or inactivity is harmful as it may deteriorate skills and have a negative impact on the individual's future labour market experience (Bell and Blanchflower, 2011, Ellwood, 1982). For youth not eligible for tertiary education, being unemployed subsequent to graduation from upper-secondary education decreases earnings and increases the risk of unemployment at least five years after graduation (Nordström Skans, 2011). On the other hand, for youth who attain tertiary eligibility in upper-secondary schooling, investing in higher education is a way for the individual to avoid spending time in problematic states as unemployment or inactivity. Eligibility for tertiary education may therefore reduce youth inactivity and its negative externalities. A negative externality of unemployment that has received much attention is crime.

This study provides empirical evidence of a negative tertiary eligibility effect on crime. Whereas voluntary educational attendance effects (Tauchen et al., 1994) and educational incapacitation effects (Jacob and Lefgren, 2003; Luallen, 2006, Åslund et al. 2012; Andersen, forthcoming) on crime have been investigated and found to affect crime rates, tertiary eligibility effects on crime rates have not been investigated. Because criminal behaviour peaks in late adolescence (see for example Hirschi and Gottfredson (1983) or Åslund et al. (2012)), and juvenile arrests are an important predictor of adult arrests (Williams and Sickles, 2002), finding that tertiary eligibility decreases crime rates has long-standing importance.

However, estimating voluntary attendance and eligibility effects on crime is challenging because educational investments are endogenous decisions. First, criminal activity may influence educational attainment, which results in reverse causation (Hjalmarsson, 2008), and, second, unobserved individual characteristics affecting both educational attainment and crime might bias

the attendance and eligibility effects. Thus, to identify a causal tertiary eligibility effect, we need an eligibility variation that is exogenous to the educational achievement and criminal activity of the individual.

After the change to a goal- and criterion-referenced grading system in 1994, there was a substantial grade inflation which also affected tertiary eligibility; tertiary eligibility increased by more than 6 percentage points between 1998 and 2003. Thus, since the eligibility increase is exogenous to the educational achievements of a student cohort, i.e. not represented by a corresponding knowledge increase (Björklund et al., 2010; Clifordsson 2004; Gustafsson and Yang Hansen, 2009, Wikström and Wikström, 2005), we can use it to identify a causal effect of tertiary eligibility on crime. Using aggregate municipality data, we analyse, in a fixed effect model, whether a larger share of eligible individuals affects crime rates in the municipalities. After the problem of grade inflation was brought to public attention in 2004, through the investigation of the goal- and criterion-referenced grading system by the Swedish National Audit Office, grades and eligibility rates were kept constant at the 2003-year level. Hence, since grade inflation ended, we can use the post-inflation period to test if the eligibility effect on crime is truly a causal effect of the inflation in eligibility for tertiary education.

Increasing eligibility for tertiary education reduces the barriers to higher education and thus affects the schooling investment decision. In fact, it makes higher education available for individuals who would have invested in higher education without the eligibility criteria, i.e. for individuals with a positive net utility from education. In a schooling system such as the Swedish one, where higher education is tuition-free, the eligibility criterion is an actual barrier, whereas in a schooling system with high tuition fees, the marginal group (the lower end of the upper-secondary grade distribution) is less likely to invest in higher education anyway.

Theoretically, because ability is assumed to determine the marginal return to schooling (Card, 1999), individuals who are eligible for tertiary education due to grade inflation are likely to have weak preferences for education. This implies that the marginal cost of education has to be low for these individuals as well; otherwise, they will not decide to invest in tertiary education. As already indicated, the financial costs of higher education are generally low in Sweden; tuition-free, and loans and grants¹ for everyone. However, for individuals living far from a university, commuting and moving costs increase the marginal costs of education. The emotional costs of moving (leaving family and friends) may also increase with distance, and in regions without a university the norms may not favor higher education. Thus, even if the individual is eligible for tertiary education, the distance to the nearest university is assumed to influence the decision to escape from problematic states and avoid criminal activity. Plausibly, the relationship between tertiary eligibility and crime should be larger in regions close to a university, and such a finding strongly supports causality. Hence, the hypothesis is tested by comparing the tertiary eligibility effect in regions with, or close by, a university or a university college, with the tertiary eligibility effect in regions far from a university or a university college.

This study finds that the eligibility rate affects crime, both property and violent crime. Because the effect vanishes when the period of grade inflation in the eligibility rate ends, we are certain that the eligibility effect is caused by the exogenous grade inflation. Finally, the eligibility effect decreases with the distance to the nearest university.

2. Earlier research

Studies evaluating the causal impact of education on crime mainly uses changes in schooling laws. Lochner and Moretti (2004) uses changes in state compulsory schooling laws over time to

¹ The grant makes up about 30% of the total financial support, i.e. both the grant and the loan.

identify the causal effect of education on crime. For US, they reveal that education reduces the probability of incarceration and arrest. Another study is Machin, Marie and Vujić (2011), who find, for England and Wales, that changes in the compulsory school leaving age in the early 1970s reduced property crimes. In a recent study for Sweden, Hjalmarsson, Holmlund and Lindquist (2013) uses a reform in the 1950s, which extended compulsory schooling from 7 to 9 years. Because the reform was implemented at different times in different regions it can be used to estimate a causal educational effect on crime. They find that one additional year of schooling decreases the probability of conviction and incarceration persistently. Moreover, expansion of the UK post-compulsory education system in the 1980s and 1990s seems to have decreased crime rates (Machin, Marie and Vujić, 2012).

To explain these results, education is, first of all, assumed to increase the wage rate and thereby increase the opportunity cost of crime (Lochner and Moretti, 2004). Gould et al. (2002), Grogger (1998) and Machin and Meghir (2004) are studies supporting this explanation, and they all find a positive relationship between wages and property crime. The propensity to commit crime may also decrease if education reduces the discount rates of future wages (Lochner and Moretti, 2004). To our knowledge, there is no study on this mechanism, but, since upper-secondary dropouts seem to be more myopic and value the costs of education highly (Oreopoulos, 2007), this explanation is plausible.

The mechanisms above perceive education as either productivity enhancing or preference altering, but education may also reduce the probability of being in crime-related states (such as unemployment or inactivity). Thus, since education removes people from problematic labour market states, increasing the higher education opportunities may have a negative impact on crime rates. School attendance is found to affect crime rates negatively through both a voluntary attendance effect and an incapacitation effect. Tauchen et al., (1994) show evidence that the

percentage of years in education has a negative effect on the probability of arrest. The incapacitation effect has been identified using exogenous events such as teacher strikes (Jacob and Lefgren, 2003) or teacher training days (Luallen, 2006). The incapacitation effect seems to decrease crime generally, and not only as a displacement of crime over time (Luallen, 2006). Increasing state compulsory dropout ages (which requires youth to stay in school at least one additional year) reduces arrests by almost 10 percent (Anderson, forthcoming). Finally, Åslund et al. (2012) find, for Sweden, an incapacitation effect on property crimes of extending the vocational upper-secondary school track from two to three years. The effect is mainly concentrated to the prolonged third year of education.

Since the schooling investment decision and the decision to be involved in crime are determined by labour market conditions, we further survey the large literature on labour market conditions and crime. Particularly the results for youth and the effects of idleness on crime are of importance to us.

Although the positive link between labour market conditions and crime is well established (Mustard, 2010), the link is not yet fully understood. Economic theory establishes that labour market opportunities affect the choice between legal and illegal activities (Ehrlich, 1973), and applied research consistently concludes that a one percentage-point increase in the unemployment rate increases property crimes by one to two percent (Lin, 2008; Mustard, 2010; Winter-Ebmer; 2001). Swedish studies that show evidence of an unemployment-effect on property crimes are Edmark (2005) and Agell and Öster (2007).

What the above studies have in common is that they estimate a fixed effects model using aggregate regional data, but recent studies have found unemployment effects on crime in individual data as well (Grönqvist, 2011; Rege et al., 2009). Moreover, because employees and businesses may leave areas with high crime rates (Gould et al., 2002; Willis, 1997), reversed

causation might bias the OLS-unemployment effect on crime. Studies that use IV-estimation to tackle the endogeneity problem find unemployment effects that are about three times as high as the OLS estimates (Mustard, 2010; Lin, 2008).

Of specific interest for this study is the labour market experience of youth. However, evidence of an impact of the youth unemployment rate on crime is mixed: whereas Fougère et al. (2009) finds a positive effect for France, an effect has not been identified for the US (Lin, 2008) or Sweden (Agell and Öster, 2007). On the other hand, Grogger (1998) uses US individual data (NLSY), and finds evidence of a relationship between the wages of youths and property crimes.

In contrast to economic theory, which proposes a relationship between the labour market and property crimes, the distress² and anger of unemployment (Agnew, 1992) are assumed to have an impact on violent crimes. This perspective has not received much attention because empirical evidence of a positive unemployment effect on violent crimes is scarce. Yet, studies to recognize long-term unemployment, which possibly better identifies the marginal group committing violent crimes, finds an effect on violent crimes (Almén and Nordin, 2011; Grönqvist, 2011).

Another mechanism, proposed by Felson (1998) suggests that idleness and less structured daily routines result in an excess of time and opportunities to engage in criminal activities. Idleness might also increase the exposure to criminogenic settings, where alcohol and drugs are common and the social norms against deviant behaviour are weak (Hirschi, 1969). Because unemployment affects crime more during weekdays than weekends (Rege et al., 2009; Grönqvist, 2011), it indicates that idleness is an element related to crime.

3. Grade inflation, study places and school competition

² *General strain theory* particularly stresses the fact that deviant behaviour is caused by the strain on an individual (Agnew, 1992).

With the introduction of the goal- and criterion-referenced grading system in 1994, grades in Sweden started to increase. Between 1996 and 2004 the average grades (meritvärde) increased by about 0.25 standard deviations (Gustafsson and Yang Hansen, 2009), and the students with the maximum grade increased from less than 0.1 percent to about 1 percent (Vlachos, 2010). Because a similar increase in knowledge has not been found (Björklund et al., 2010, Cliffordsson 2004, Gustafsson and Yang Hansen, 2009), and international tests such as PISA, TIMSS and PIRLS actually report a decrease in math, science and readability (Skolverket 2012), the consensus is that the increase is due to grade inflation. The grades stopped increasing after 2003, probably due to a general awareness of the phenomena, which culminated with the inspection of the goal- and criterion-referenced grading system by the Swedish National Audit Office in 2004.

Grade inflation also increased the share with basic eligibility to tertiary education by more than 6 percentage points between 1998 and 2004, which is illustrated in Figure 1.³ Figure 2 shows that there is variation in the size of the increase in tertiary eligibility between municipalities, and for some municipalities there is a decrease in the tertiary eligibility rate. The increase in basic tertiary eligibility has not received attention, since grade inflation is mainly seen as an equality problem and a screening problem.⁴ Inequality is manifested in cohort inequality and inequality in parental background since affluent parents may choose high-grading schools for their children. Grade compression reduces the informative signal and legitimacy of grades, which may harm high-ability students.

Figures 1 and 2 about here

³ The drop in the tertiary eligibility rate in 2000 was probably due to nationally agreed criteria for the highest grade “Pass with special distinction”. Before 2000 there were only national criteria for the lower grades. Why these criteria spill over onto tertiary eligibility is uncertain, but a similar drop is found for average grades. However, the criteria had only a short-term influence on the tertiary eligibility rate, and in 2001 the tertiary eligibility rate was higher than in 1999.

⁴ Another reason for the lack of attention is that research has mainly focused on grade inflation in compulsory schooling, and a similar increase has not been found in the case of upper-secondary school eligibility. Rather, upper-secondary school eligibility seems to have decreased during the period 1998 to 2010.

On the other hand, decreasing the basic eligibility requirements mainly affects the lower part of the skill distribution, and makes higher education available for youth at the margin of reaching tertiary eligibility; without the grade inflation, they would not have the opportunity to invest in higher education. Whereas it may be problematic for low-ranked colleges and less attractive study programmes to admit and educate weak students, there might be some benefits as well. Because the unemployment rate of low-skilled youth in Sweden is high, higher education may be an exit-plan out of long-term unemployment for eligible individuals, and might reduce the negative externalities of unemployment.

Thus, if there are more study places than eligible students, every eligible student will have the opportunity to invest in higher education. Since the beginning of the 1990s study places have increased, and between 1998 and 2010 they increased by about 30 percent. However, as the number of youth between the ages 19 and 25 increased sharply as well (by almost 20 percent between 1998 and 2010), study places per youth between 19 and 25 increased less, by about 10 percent.⁵ To make sure that it is not the change in study places that is responsible for the relationship between tertiary eligibility and crime, the number of beginner students in higher education in each municipality is taken into account in the analysis.

Although the introduction of the goal- and criterion-referenced grade system (and the removing of national tests) is assumed to be the main reason for the grade inflation, increased school competition is probably also a responsible factor (Wikström and Wikström, 2005). Since the academic year 1992, every Swedish student has had a right to choose to attend a school outside the local school district, and the school voucher moves with the student. This had an effect on school competition and the number of private schools increased dramatically. In upper-

⁵ Using cohort data, and the yearly numbers of individuals in tertiary education, we calculate these numbers. The data comes from Statistics Sweden.

secondary education, for example, the number of private school increased by almost 200 percent between 2001 and 2009, and the share of students choosing a private school increased from 2 to about 20 percent in 2009 (Skolverket, 2012). However, according to Vlachos (2010), school competition is a general phenomenon, and private schools are only responsible for a minor part of the grade inflation.

On top of all the educational reforms, the student population in upper-secondary education increased by 27 percent between 2000 and 2009 (Skolverket, 2012). This had the implication that public schools kept their student population (about 300,000 students), and that private schools were able to attract students in relation to the increase in the student population. Plausibly, the increasing student population sharpened school competition and increased grade inflation.

Finally, increasing the academic content and the length of the vocational upper-secondary tracks in Sweden in 1991 led to vocational education attaining basic eligibility for university studies. The reform did not affect university enrolment or graduation, but increased the dropout rate of vocational education (Hall, 2012). Between 1998 and 2010 the upper-secondary dropout rate increased by about 5 percentage points, which is a fact that has to be considered when evaluating the effects of tertiary eligibility.

4. Data

The panel data set consists of annual data for 287⁶ municipalities over the period 1998 to 2010. With some missing values, we end up with 3,687 observations. The Swedish National Agency for Education (Skolverket) is our source for most of the educational data, e.g. grades, student population and the share finishing upper-secondary education. However, the eligible-for-tertiary-

⁶ There are 290 municipalities in Sweden, but Nykvarn and Knivsta were created during the period and are therefore excluded. For Bjurholm most of the educational data is lacking.

education measure is collected from Statistics Sweden, since they report the variable for a longer period than The Swedish National Agency for Education. The number of beginner students in higher education in each municipality is obtained from the Swedish higher education authority.

Eligibility for tertiary education is measured as the ratio between the number of graduated students eligible for tertiary education in year t and the total number of students graduated in year t . For a diploma providing eligibility for tertiary education, students should have passing-grades in 90 percent of the course credits. Graduation is not based on educational performance; it is simply a matter of finishing three years of upper-secondary education.

Crime rates are provided by The National Council for Crime Prevention (NCCP), and they are reported as crimes per 100,000 inhabitants. We divide the crimes into property crimes and violent crimes, but we also analyse specific crime categories. The crime rate has increased by 10 to 20 percent since 1985, as shown in Figure 3. Property crime includes Burglary, Thefts and Pilfering, Thefts from Vehicles and Handling Stolen Property.⁷ For violent crimes the categorization follows that of NCCP, with one exception - robbery is excluded from violent crimes. The reason for this is that the motive for robbery is mostly monetary, and for the sake of the analysis we want to focus on “pure” violent and property crime-categories.

Figure 3 about here

The figure also illustrates the change in the property crime rate and the violent crime rate, separately. For property crimes we find a steady decrease in crime rates during the last decade; they have decreased by about 30 percent since 2000. An entirely different trend is found for violent crimes, which have gradually increased for a long time; they rose by more than 40 percent from 1998 to 2010. A survey has shown that a higher reporting rate is the explanation for the

⁷ We exclude Vehicle Thefts. Due to technological advances, cars are difficult to steal today, and with a 60 percent drop in vehicle thefts since the beginning of the 90s (NCCP, 2008) this crime category is difficult to analyse.

increase in reported violent crimes (NCCP, 2008).

5. Econometrical specification

The main difficulty in identifying the educational attainment effect on crime is the endogeneity of choices; the same characteristics that determine the achievement in school may also determine the choice between legal and illegal activities (Lochner and Moretti, 2004). Theoretically, when individuals evaluate the expected utility of legal and illegal activities and choose the one with the highest payoff (Becker, 1968), the schooling investment decision has to be considered since schooling determines the utility of legal activities. The endogeneity of school and crime may bias the effect of educational attainment on crime if the educational investment and the crime decision occur simultaneously. Moreover, criminal activity may precede and cause weak school achievement, which implies a case of reverse causation.

With aggregate data, cohort-differentials in characteristics may bias the tertiary eligibility effect, so that some student cohorts are more inclined to choose criminal activities over non-criminal activities (e.g. schooling). Factors that could create cohort-differentials are, for example, changes in inequality, parents' educational level, immigrant composition or school resources.

Hence, to be able to estimate an unbiased educational attainment effect on crime, the change in educational attainment has to be exogenous. Because the grade inflation increased the measured achievements in school and the share with tertiary eligibility (as illustrated in Figure 1), we can exploit this variation to estimate a causal effect of tertiary eligibility on crime.

The model specification is the standard when using aggregate panel data. Thus, by using a fixed effect model with a full set of time and municipality-dummies, we estimate the effect of the *within-municipality* variation in eligibility for tertiary education on crime. That is, with:

$$\text{Ln}(\text{Crime}_{it}) = \alpha_i + \delta_t + \beta \text{Eligibility}_{it} + \rho X_{it} + \varepsilon_{it} \quad (1)$$

we receive the tertiary eligibility effect on crime, β . In this model, α_i represents unobservable municipality characteristics that are constant over time, and δ_t is time-fixed effects. X represents additional covariates.

By comparing the effect of the grade inflated tertiary eligibility share on crime, with the effect of finishing upper-secondary education (get a final grade), but without receiving tertiary eligibility, we can distinguish between different mechanisms. That is, since finishing upper-secondary is merely a question of completing three years of upper-secondary studies and not the grades as such, there is no inflation in the share finishing upper-secondary school. In addition, by controlling for the share finishing upper-secondary school, the tertiary eligibility effect is not caused by a change in the denominator of the eligibility ratio, i.e. in the ratio between students eligible for tertiary education and students finishing upper-secondary school. Without controlling for the share finishing upper-secondary school, the tertiary eligibility effect on crime may be caused by selection in the sample of students finishing upper-secondary school. In other words, if the upper-secondary school dropout rate increases, the population finishing upper-secondary school may become more selective and more likely to attain tertiary eligibility, and in that case the increased tertiary eligibility rate may be related to dropout rate rather than grade inflation.⁸ Because the tertiary eligibility and the finishing upper-secondary measure are calculated somewhat differently, we add both a current and a lagged finishing upper-secondary measure. That is, whereas the tertiary eligibility measure is based on the share graduating a single year (i.e. mainly the age group 19, but also those starting education a year earlier and those finishing

⁸ We have also tried computing the share eligible from tertiary education in relation to the entire cohort. But this specification captures both variations in the share finishing upper-secondary school and variations in the share with tertiary eligibility. Thus, the estimated effect includes the dropout effect on crime, which is something entirely different from the true tertiary eligibility effect which we try to isolate with the grade inflation in the tertiary eligibility rate.

upper-secondary later), the finishing upper-secondary rate is based on those aged 20. So here the lead (t+1) finishing upper-secondary rate for those aged 20 is the current finishing upper-secondary rate for those age 19; the current (t) finishing upper-secondary rate for those aged 20 is the lagged (t-1) finishing upper-secondary rate for those age 19.

The cohort of youth aged nineteen (divided with the total population) is also included, otherwise crime rates may be affected by variations in the size of the cohort finishing upper-secondary school, i.e. when the upper-secondary school incapacitation effect is lost, crime rates may increase.

Every student has a right to begin upper-secondary school. When lacking upper-secondary eligibility the student begins a certain programme named the individual programme. Almost every student begins either the national or the individual programme (98.3 percent). The aim is to transfer into the standard national upper-secondary school programme later, but the student could also receive a final grade from the individual programme. The individual programme cannot give tertiary eligibility, but participants are registered as finishing upper-secondary school. Thus, uncontrolled variations in the share beginning an individual programme could bias the results in this study. However, from 1999 we have information on the share finishing an individual programme, but including this information does not affect the results.

Because the number of study places in tertiary education increased substantially between 1998 and 2003, the tertiary eligibility effect may be related to this fact rather than grade inflation. By including a variable explaining, on the municipality level, the share of beginners in tertiary education in relation to the total population (based on residence the year before beginning tertiary education), this mechanism should be captured. That is, if crime rates are negatively influenced by an increasing share of university beginners generally, controlling for the share of beginners in higher education should remove a potential upward bias in the tertiary eligibility effect. In

addition, by controlling for the share of tertiary beginners, a decrease in crime rates caused by the outflow of students from the municipality should not bias the tertiary eligibility effect.

We include a set of demographical controls in the main specification. The demographical covariates are *Share of men*, *Share with foreign background* (including both first and second generation immigrants), *Inflow* and *Outflow* (number of migrants in and out of the municipality divided by the population size), *Logarithmic population size* and the demographic age structure. In a next step we add socioeconomic covariates, alcohol consumption and additional school characteristics. These are not included in the main specification due either to their endogenous character or missing variables. Finally we include municipality-specific time trends. Table A1 lists all the variables used in this study and reports some descriptive statistics.

6. Results

6.1 Main results

Table 2 presents the fixed effect results for property and violent crimes, separately. In the first two columns we use the entire period,⁹ and in the last two we estimate the tertiary eligibility effect on crime for the post-inflation period. Columns (1) and (2) show that increasing the tertiary eligibility effects by a one-percentage point decreases property crimes by 0.29 percentage points and violent crimes by 0.25 percentage points. Because the unemployment rate, which is based on changes in the unemployment rate of the entire population, increases property crime by around 1 to 2 percent (Lin, 2008, Mustard, 2010), a tertiary eligibility effect, which is based on changes in the tertiary eligibility of one single cohort, of 0.25 or higher is a very large effect. The results show that changing the criminal behavior in peak criminal ages has a huge impact, and, if it also

⁹ We could have estimated the result for the grade inflation period separately too, and received, basically, the same tertiary eligibility effects. However, with a smaller sample the standard deviations increase, and for some of the sensitivity tests this is a problem.

decreases adult arrests, the long-lasting impact may be even larger. When excluding the demographical covariates, the tertiary eligibility effects are about 15 percent higher (not reported), and when excluding the variables finishing upper-secondary education, student population and tertiary beginners, the tertiary eligibility effect on violent crimes increases to around 0.4, but the effect on property crimes is unchanged.

For the post-inflation period (columns (3) and (4)), the tertiary eligibility effect disappears.¹⁰ This finding indicates that changes in the rate of tertiary eligibility caused by variation in cohorts' educational achievements do not affect crimes, but when the requirements for reaching eligibility are changed, students, who would otherwise not be eligible for higher education, commit less crime. In the next section, where we add grades to remove additional changes in cohort educational achievements, we find that the tertiary eligibility effect actually increases when grades are controlled for; a finding that supports that it is grade inflation in the tertiary eligibility rate, and not cohort-variations in scholastic abilities, that causes the tertiary eligibility effect on crime.

Column (2) of Table 2 shows that the current share finishing upper-secondary education affects property crimes negatively, and the lagged share finishing upper-secondary education affects violent crimes negatively. However, since the significant effects of finishing upper-secondary school remain after the grade inflation period, and the current finishing upper-secondary education estimate on violent crimes turns significant (see columns (3) and (4)), a different mechanism is indicated, and in this case the causation might, partly or entirely, go the other way around, i.e. from criminal activity and bad behavior to school achievements. Likewise,

¹⁰ The insignificant tertiary eligibility effects on crime for the post-inflation period is not caused by a lack of within-variation in the tertiary eligibility variable. Although the within variation in tertiary eligibility is smaller during the post-inflation period, .032, than for the grade-inflation period, .048, the variation should be large enough to isolate an effect of tertiary eligibility on crime.

grade inflation does not cause the negative impact of beginning tertiary education on violent crimes, since the effect remains after the post-inflation period.

We have also investigated the tertiary eligibility effect on particular crimes types. Table A2 shows these estimates. We find significantly negative tertiary eligibility effects on burglary, theft and pilfering, theft from vehicles, assault and rape. Because university studies may invite drug and alcohol use, it may explain why we do not find positive effects on alcohol and narcotics crimes.

6.1 Sensitivity tests of the tertiary eligibility effect

In Table 3 we add additional controls to test the robustness of the tertiary eligible effect on crime. In column (1) we add the income level, three different unemployment rates (total, long-term and youth) and three public cost measures (social, educational and cultural). Since alcohol consumption is known to affect crime rates, and youth are known to drink a lot, we add an alcohol measure to the model. These variables have not been added to the baseline specification due to their endogenous character, but their inclusion does not affect the tertiary eligibility effects on crime (and the effects remain the same even if we add them step-wise). In particular, long-term unemployment affects violent crimes, a finding documented earlier in Almèn and Nordin (2011).

As a next step we add several school characteristics that might affect both the eligibility rate and crimes; the share attending a private school, the share with a foreign background at the schools, and the average grades. Since there are many missing values for these variables, we lose 27 percent of the sample, but the sample change does not, in itself, affect the eligibility effect of tertiary education (found when estimating the model for this sample, without adding the school characteristics). From column (2), for property crimes, and column (6), for violent crimes, we see

that the school characteristics do not affect the eligibility effect of tertiary education; adding them rather increases the effect for property crimes. Another interesting finding is that the grades do not affect crime rates, which reveals that the overall grade inflation does not affect crimes. This result stands when removing the tertiary eligibility variable, indicating that the individuals receiving tertiary eligibility due to the grade inflation are, in general, not accepted into higher education on their inflated grades. In Sweden, almost 30 percent of those accepted into higher education are accepted on the basis of a scholastic aptitude test (given basic tertiary eligibility), and the individuals receiving tertiary eligibility are probably accepted on this test result.

The propensity to report a crime has changed over time and the propensity may have varied across Sweden over time as well (NCCP, 2008). By including linear and quadratic municipality-specific time trends, we try to correct for such variation. Columns (3) and (7) contain the results when adding linear time trends, and in columns (4) and (8) linear- and quadratic time trends are added. The tertiary eligibility effect on property crimes decreases somewhat, but it stays large and significant. The tertiary eligibility effect on violent crimes becomes insignificant when adding both the linear- and quadratic trends, though. However, one has to keep in mind that adding both a linear and a quadratic trend removes a large share of the variation in the dependent variable. Since the tertiary eligibility effect is derived from a continuous increase in the tertiary eligibility rate, this exercise is not evidence for concluding that tertiary eligibility does not affect violent crimes. On the other hand, finding a tertiary eligibility effect on property crimes, *with* the time trends included, is strong evidence of causality.

6.2 *Does the distance to a university affect the tertiary eligibility effect on crime?*

All else equal, high marginal costs of education decrease the individual's probability of investing in higher education. The marginal individuals who become eligible for tertiary education due to

grade inflation may be particularly sensitive to the costs of education, since their marginal return to schooling is likely to be relatively low, on average. That is, since this group belongs to the lower end of the upper-secondary grade distribution, their scholastic abilities, determining their marginal return to schooling (Card, 1999), are plausibly low.

Although the financial costs of education are low in Sweden, moving and commuting costs, and the cost of leaving family and friends may have a large impact on the educational investment of the marginal group. Thus, a large distance from a university or a university college might reduce the probability of investing in tertiary education for those becoming eligible for tertiary education due to the grade inflation. Moreover, in regions without a university, the norms may not favor higher education. If this hypothesis is correct, the tertiary eligibility effect on crime should be smaller in regions far from a university or a university college. That is, inflation in the tertiary eligibility rate has no impact on crime rates if youth choose not to escape from inactivity or unemployment, even if they have the option.

To test this, we divide the sample of municipalities into two groups; i) those who have, or are a neighbour municipality to, a university or a university college, and ii) those who do not have, or are a neighbour municipality to, a university or a university college. For each of the groups, a separate tertiary eligibility variable is added to the specification. In columns (1) to (2) of Table 4, the tertiary eligibility effects on crime are shown for these two types of municipality groups. In line with our expectation, the tertiary eligibility effects are much larger in municipalities with, or close to, a university or a university college. For municipalities far from a university or a university college, the tertiary eligibility effects turn insignificant, but in terms of size they are still relevant. It has to be remarked that the difference in estimates between the municipality groups is not produced by a small within-variation in the tertiary eligibility rate for municipalities far from a university or a university college. In fact, the within-variation is actually

larger, 0.053, for municipalities far from a university or a university college than for municipalities with, or close to, a university or a university college, 0.045.

However, as the municipalities far from a university or a university college are more rural as well, and the relationship between crime and education might differ between urban and rural areas, we divide the groups into rural and urban regions based on their population density. In a separate model, the tertiary eligibility effect is estimated for these groups, as well. Columns (3) and (4) show that the tertiary eligibility effect is almost the same in urban and rural areas, which proves that it is the distance from a university that is important, and not that it is a rural region. This analysis shows results that are consistent with education being a way of escaping inactivity and idleness, but it shows that the costs of higher education matter too.

6.3 Investing the mechanism behind the tertiary eligibility effect on crime

To establish that the tertiary eligibility effect on crime is caused by an incapacitation effect of higher education, we explore the association between the tertiary eligibility rate and the share of university beginners. Thus, by predicting the share of university beginners in the municipality with the tertiary eligibility rate, we can test whether the tertiary eligibility effect on crime is caused by increased educational investment by the marginal group receiving tertiary eligibility due to the inflated tertiary eligibility rate. Although we proceed as if tertiary eligibility was an instrumental variable, and estimate the effect with TSLS, we do not perceive this as standard IV-estimation. Thus, because the focus in this study is on variations in the tertiary eligibility rate (the instrument in the IV-model) rather than variations in the share of university beginners (the independent variable in the IV-model), we prefer the reduced form approach to the IV-approach.

Still, here we evaluate if the *local average partial effect* from the TSLS model is similar to the OLS effect.¹¹ That is, we compare the IV tertiary *beginner* estimate with the OLS tertiary *eligibility* estimate. Similar or larger IV effects indicate that the tertiary eligibility effect on crime is truly caused by education investments.

Table 4 reports the second-stage results of the TSLS estimation. To also consider the finding in section 6.2, where the distance to a university or a university college seems to be a determinant of higher education we estimate the model separately for municipalities with, or close to, a university or a university college, and municipalities far from a university or a university college. Columns (1) and (2) show the second-stage effects for municipalities with, or close to, a university or a university college on property and violent crimes, respectively. Columns (3) and (4) show the same results for municipalities far from a university or a university college.

For municipalities with, or close to, a university or a university college, the estimates are roughly the same, above -0.3, for both crime types, i.e. very similar to the OLS estimates in Table 4. The relationship between the tertiary eligibility rate and the share of university beginners is strong, which the weak IV-test shows. A weak instrument gives biased estimates and underestimated standard errors. A rule of thumb is that the F-statistic should be above 10, and here the F-statistic is 30.4.¹² However, for municipalities far from a university or a university college, the relationship between the tertiary eligibility rate and the share of university beginners is weak (the weak IV-test statistics is 0.5). The weak relationship is in line with the finding

¹¹ This approach is not the main model in this study, because aggregate data on university beginners capture partly migration patterns. With individual data, on the other hand, the variation in the schools' inflated tertiary eligibility rates could be used (in a school fixed effect model) as instruments for the individual's investment in higher education. However, this is a somewhat different research question.

¹² The Kleibergen Paap statistic is to be used when the standard errors are clustered (which is a heteroskedasticity robust generalization of the Cragg–Donald F-statistic). Since critical values have not yet been generated for the Kleibergen Paap statistic, it is customary to use the critical values for the Cragg–Donald F-statistic, available in Stock and Yogo (2005).

above: that the inflated tertiary eligibility rate gives few additional higher education investments in regions far from a university or a university college, and, with few educational investments, the impact on crime is insignificant.

The conclusion from this exercise is that the tertiary eligibility effect on crimes is certainly caused by investments in higher education. We have estimated the effect of tertiary eligibility on youth unemployment as well, and found that it significantly decreases the unemployment level, but the effect is relatively small.

7. Conclusions

We offer a new understanding of how the educational system affects crime rates. The idea is that investment in higher education is a way of escaping youth inactivity and idleness, and, since youth inactivity is known to trigger crime, the self-incapacitation effect of education decreases the individual's probability of committing crime. However, youth with a high probability of deviant behaviour are also likely to have poor upper-secondary schooling achievements, and may therefore lack tertiary eligibility. That is, for youth with the largest benefit from escaping a criminogenic setting through higher education, the main tool, tertiary eligibility, is often missing. Hence, this study investigates whether an increased tertiary eligibility rate decreases crime rates.

To identify the tertiary eligibility effect on crime, we use a variation in tertiary eligibility that came from a substantial grade inflation in the tertiary eligibility rate. Because inflation in the tertiary eligibility rate is exogenous to the educational attainments of a student cohort, we argue that the tertiary eligibility effect is causal. We find a negative tertiary eligibility effect on property and violent crimes, but that the effects disappear when the period of grade inflation ends. In line with theory, for youth with high marginal costs of education, the tertiary eligibility

effect on crime is absent, i.e. even if grade inflation provides them with tertiary eligibility, they will decide not to use the higher education opportunity.

The apparent implication is that policies aimed at increasing the share with tertiary eligibility through improved scholastic achievement are important as they reduce crime rates. However, the main implication is that the same result is obtained by lowering the requirement for obtaining tertiary eligibility, so that fewer youth are trapped in long-term unemployment and inactivity. In Sweden, where about 30 percent of the share accepted into higher education is based on a scholastic aptitude test and not on their upper-secondary school achievements, using tertiary eligibility as an additional barrier to higher education may have negative consequences. In other words, if a person proves scholastic ability on the test, why deny the person the option of higher education?

References

- Anderson, M. (forthcoming). In School and Out of Trouble? The Minimum Dropout Age and Juvenile Crime. *Review of Economics and Statistics*.
- Agell, J., & Öster, A. (2007). Crime and Unemployment in Turbulent Times. *Journal of the European Economic Association*, 5(4), 752–775.
- Agnew, R. (1992). Foundation for a general strain theory of crime and delinquency. *Criminology*, 30(1), 47–87.
- Almén, D., & Nordin, M. (2011). Long term unemployment and violent crimes - using post-2000 data to reinvestigate the relationship between unemployment and crime. S-WoPEc No. 2011:34.
- Becker, G. (1968). Crime and Punishment: An Economic Approach. *The Journal of Political Economy*, 76, 169–217.
- Bell, D., & Blanchflower, D. (2011). Youth Unemployment in Europe and the United States. *Nordic Economic Policy Review*, No. 1, 11–38.
- Björklund, A., Fredriksson, P., Gustafsson, J-E., & Öckert, B. (2010). Den svenska

utbildningspolitikens arbetsmarknadseffekter: vad säger forskningen?, IFAU Rapport 2010:13.

Card, D. (1999). The Causal Effect of Education on Earnings. In O. Ashenfelter, & D. Card (Eds.). *Handbook of Labour Economics*. Oxford: Elsevier Science, 1801-1863.

Cliffordson, C. (2004). Betygsinflation i de målrelaterade Gymnasiebetygen. *Pedagogisk Forskning i Sverige*, 9(1), 1–14.

Edmark, K. (2005). Unemployment and Crime: Is There a Connection? *Scandinavian Journal of Economics*, 107(2), 353–373.

Ehrlich, I. (1973). Participation in Illegitimate Activities: A Theoretical and Empirical Investigation. *Journal of Political Economy*, 81, 521–565.

Ellwood, D. (1982). Teenage Unemployment: Permanent Scars or Temporary Blemishes. In R. Freeman, & D. Wise (Eds.) *The youth Labor Market Problem: Its Nature Causes and Consequences*. Chicago: University of Chicago Press, 349–390.

Felson, M. (1998). *Crime and everyday life*. Thousand Oaks: Pine Forge Press.

Fougère, D., Kramarz, F., & Pouget, J. (2009). Youth Unemployment and Crime in France. *Journal of European Economic Association*, 7(5), 909–938.

Gould, E. Weinberg, B., & Mustard, D. (2002). Crime Rates and Local Labor Market Opportunities in the United States: 1979–1997. *Review of Economics and Statistics*, 84(1), 45–61.

Grogger, F. (1998). Market Wage and Youth Crime. *Journal of Labor Economics*, 16(4), 756–791.

Grönqvist, H. (2001). Youth Unemployment and Crime: New Lessons Exploring Longitudinal Register Data. Working Paper 7/2011, (SOFI), Stockholm University.

Gustafsson, J-E., & Yang Hansen, K. (2009). Resultatförändringar i svensk grundskola. In *Vad påverkar resultaten i svensk grundskola? Kunskapsöversikt om betydelsen av olika faktorer*, Skolverkets rapport (p. 40–85).

Hall, C. (2012). Does making upper secondary school more comprehensive affect dropout rates, educational attainment and earnings? Evidence from a Swedish pilot scheme. *Journal of Human Resources*, 47, 237–269.

Hirschi, T. (1969). *Causes of Delinquency*. Berkely: University of California Press.

Hirschi, T., & Gottfredson, M. (1983), Age and the Explanation of Crime. *American Journal of*

- Sociology*, 89(3), 552–584.
- Hjalmarsson, R. (2008). Criminal Justice Involvement and High School Completion. *Journal of Urban Economics*, 63, 613–630.
- Hjalmarsson, R., Holmlund, H., & Lindquist, M. (2013). The Effect of Education on Criminal Convictions and Incarceration: Causal Evidence from Micro-data, Working Paper.
- Jacob, B., & Lefgren, L. (2003). Are idle hands the devil's workshop? Incapacitation, concentration and juvenile crime, *American Economic Review*, 93, 1560–1577.
- Lin, M-J. (2008). Does Unemployment Increase Crime? Evidence from U.S. Data 1974-2000. *The Journal of Human Resources*, 43(2), 413–436.
- Lochner, L., & Moretti, E. (2004). The Effect of Education on Crime: Evidence From Prison Inmates, Arrests and Self-Reports, *American Economic Review*, 94, 155–189.
- Luallen, J. (2006). School's Out.....Forever: A Study of Juvenile Crime, At-Risk Youths and Teacher Strikes. *Journal of Urban Economics*, 59, 75–103.
- Machin, S., & Meghir, C. (2004). Crime and Economic Incentives. *The Journal of Human Resources*, 39(4), 958–979.
- Machin, S., Marie, O., & Vujić, S. (2012). Youth Crime and Education Expansion. *German Economic Review*, 13, 366–84.
- Machin, S., Marie, O., & Vujić, S. (2011). The Crime Reducing Effect of Education. *Economic Journal*, 121(552), 463–484.
- Mustard, D. (2010). How Do Labor Markets Affect Crime? New Evidence on an Old Puzzle. In B. Benson, & P. Zimmerman (Eds.), *Handbook on the Economics of Crime*. Cheltenham: Edward Elgar Publishing, 342–358.
- NCCP (2008). Brottsutvecklingen i Sverige fram till år 2007. Report 2008:23. Stockholm: The National Council for Crime Prevention.
- Nordström Skans, O. (2011). Scarring Effects of the First Labor Market Experience. IZA DP No. 5565.
- Oreopoulos, P. (2007). Do Dropouts Drop out too Soon? Wealth, Health and Happiness From Compulsory Schooling. *Journal of Public Economics*, 91, 2213–2229.
- Rege, M., Skardhamar, T., Telle, K., & Votruba, M. (2009). The effect of plant closure on crime. Discussion Papers No. 593. Statistics Norway, Research Department.
- Raphael, S., & Winter-Ebmer, R. (2001). Identifying the Effect of Unemployment on Crime.

Journal of Law and Economics, 41, 259–283.

Skolverket (2012). Betygsinflation – betygen och den faktiska kunskapsutvecklingen. Dnr 2012:387.

Tauchen, H., Witte, A., & Griesinger, H. (1994). Criminal Deterrence: Revisiting the Issue With a Birth Cohort. *Review of Economics and Statistics*, 76, 399–412.

Vlachos, J. (2010). Betygets värde. En analys av hur konkurrens påverkar betygssättningen vid svenska skolor, Konkurrensverket rapport 2010:6

Wikström, C., & Wikström, M. (2005). Grade inflation and school competition. An empirical analysis based on the Swedish upper secondary schools. *Economics of Education Review*, 24(3), 309–322.

Williams, J., & Sickles, R. (2002). An Analysis of the Crime as Work Model: Evidence from the 1958 Philadelphia Birth Cohort Study, *Journal of Human Resources*, 37(3), 479–509.

Willis, M. (1997). The Relationship between Crime and Jobs. Working paper, Santa Barbara: University of California.

Åslund, O., Grönqvist, H., Hall, C. & Vlachos, J. (2012). Education and Criminal Behavior: Insights from an Expansion of Upper Secondary School. EALE Conference paper.

Tables and figures

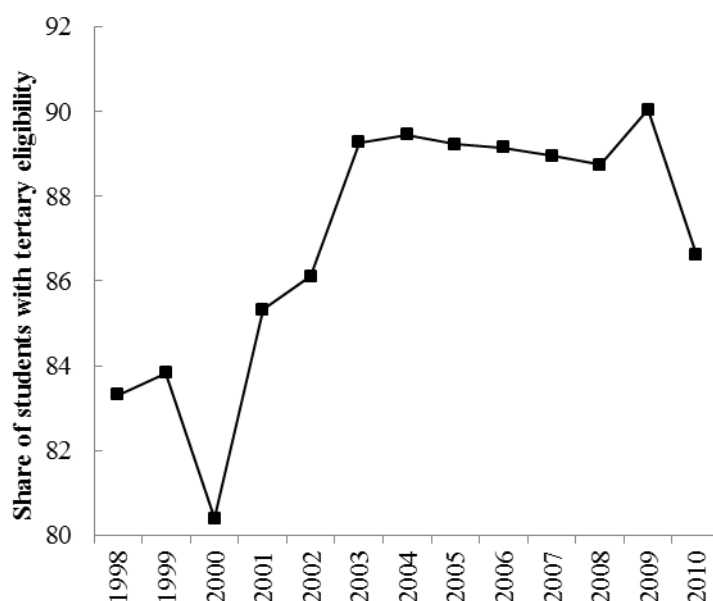


Figure 1. Illustrating the share of students with tertiary eligibility, 1998-2010.

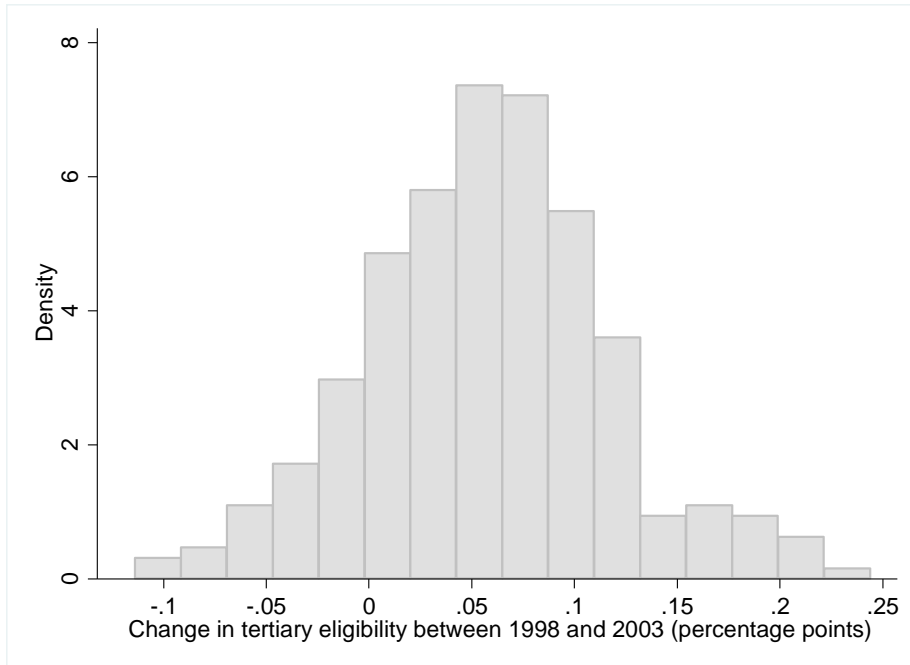


Figure 2. The distribution of changes in tertiary eligibility between 1998 and 2003 (percentage points).

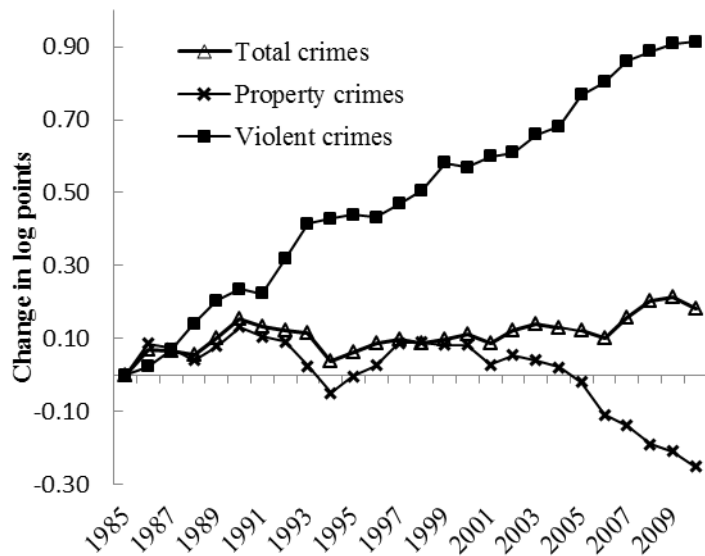


Figure 3. Illustrating the change (log.points) in crimes, 1985-2010.

Table 2. Estimating the relationship between tertiary eligibility and crime rates for different periods.

	1998-2010		2004-2010	
	Property crimes	Violent crimes	Property crimes	Violent crimes
Tertiary eligibility	-0.291*** (0.0864)	-0.250** (0.109)	-0.142 (0.115)	-0.0518 (0.132)
Finishing upper-secondary education _t	-0.115*** (0.0417)	-0.0716 (0.0535)	-0.184* (0.110)	-0.249** (0.119)
Finishing upper-secondary education _{t-1}	-0.0322 (0.0692)	-0.348*** (0.0789)	0.0742 (0.103)	-0.242** (0.101)

Student population/Total population	-0.558 (3.360)	2.827 (3.882)	-5.213 (3.963)	6.223 (4.569)
Tertiary beginners	-0.0261 (0.0191)	-0.0838*** (0.0253)	-0.0205 (0.0193)	-0.0466** (0.0194)
Ln. Total pop.	-0.319 (0.242)	-0.957*** (0.219)	-0.490 (0.340)	-0.300 (0.401)
Share of men	2.715 (2.683)	0.227 (2.968)	2.024 (3.046)	2.471 (4.599)
Share with foreign background	2.074*** (0.784)	-0.0395 (0.743)	1.598* (0.830)	-0.244 (0.826)
Outflow (share)	-0.208 (0.959)	-1.077 (1.094)	0.218 (1.178)	0.297 (1.158)
Inflow (share)	2.946*** (0.827)	1.817** (0.903)	-1.252 (0.998)	-0.804 (1.115)
Demographical age structure	yes	yes	yes	yes
Observations	3,686	3,686	2,002	2,002
R-squared	0.567	0.626	0.536	0.413
Number of mun	287	287	287	287

Notes: The dependent variables are the logarithmic numbers of crime per 100,000 inhabitants. Year and municipality fixed effects are added in every specification. The models are weighted with population size. Robust clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Sensitivity tests of the tertiary eligibility effect on crime rates.

	Property crimes				Violent crimes			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tertiary eligibility	-0.305*** (0.0851)	-0.392*** (0.104)	-0.216*** (0.0795)	-0.179** (0.0832)	-0.269** (0.107)	-0.276* (0.143)	-0.165* (0.0979)	-0.147 (0.104)
Finishing upp.-sec. ed _t	-0.126*** (0.0434)	-0.133 (0.0882)	-0.0213 (0.0497)	0.0537 (0.0578)	-0.0843* (0.0508)	-0.168 (0.103)	-0.0522 (0.0510)	-0.0692 (0.0623)
Finishing upp.-sec. ed _{t-1}	-0.0425 (0.0690)	-0.0277 (0.0786)	-0.00674 (0.0669)	0.0284 (0.0696)	-0.353*** (0.0786)	-0.321*** (0.0887)	-0.276*** (0.0828)	-0.206** (0.0846)
Student pop./total pop.	-0.180 (3.359)	4.427 (3.972)	-5.721* (3.352)	-7.229** (3.490)	2.419 (3.938)	4.082 (4.532)	7.361* (4.089)	6.442 (4.319)
Tertiary beginners	-0.0228 (0.0193)	-0.00650 (0.0207)	-0.0488** (0.0211)	-0.0630*** (0.0216)	-0.0853*** (0.0259)	-0.0795*** (0.0258)	-0.00947 (0.0237)	0.0293 (0.0264)
Ln. of income	0.444 (0.301)	0.500 (0.350)	-0.803** (0.377)	-0.368 (0.317)	-0.0222 (0.308)	-0.00146 (0.354)	0.619 (0.491)	0.327 (0.504)
Total unemployment	0.00879 (0.0059)	0.00764 (0.0068)	-0.00234 (0.0069)	0.0044 (0.0083)	-0.00889 (0.00578)	-0.0086 (0.0063)	0.00232 (0.0070)	0.0104 (0.0083)
Long-term unempl.	0.00480 (0.0123)	0.00504 (0.0134)	0.0121 (0.0124)	0.0121 (0.0122)	0.0347*** (0.0103)	0.0309*** (0.0110)	0.0254** (0.0126)	0.00747 (0.0133)
Youth unemployment	0.00104 (0.00157)	0.000458 (0.00177)	0.000715 (0.00145)	-0.000950 (0.00144)	7.36e-05 (0.00155)	0.00048 (0.00167)	-0.00121 (0.0015)	-4.83e-05 (0.00172)
Public costs	yes	yes	yes	yes	yes	yes	yes	yes
Alcohol consumption	0.0075*** (0.00212)	0.0069*** (0.0021)	-0.0006 (0.0031)	0.0019 (0.0028)	0.00074 (0.00547)	0.0015 (0.0059)	-0.0077* (0.0043)	-0.00228 (0.0036)
Grades		0.0133 (0.0100)				0.0028 (0.0104)		
Private school		-0.0009 (0.0013)				-0.0001 (0.0011)		
Foreign share at school		-0.0015 (0.0024)				0.0067** (0.0027)		
Linear time trends	no	no	yes	yes	no	no	yes	yes
Quadratic time trends	no	no	no	yes	no	no	no	yes
Observations	3,686	2,694	3,686	3,686	3,686	2,694	3,686	3,686
R-squared	0.574	0.606	0.696	0.766	0.630	0.664	0.711	0.762
Number of mun	287	233	287	287	287	233	287	287

Notes: The dependent variables are the logarithmic numbers of crime per 100,000 inhabitants. Year and municipality fixed effects and the demographical covariates in Table 2 are added in every specification. The models are weighted with population size. Robust clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Estimating the relationship between tertiary eligibility and crime rates for regions close to, or far from, a university, and urban and rural regions.

	1998-2010		1998-2010	
	Property crimes	Violent crimes	Property crimes	Violent crimes
Tertiary eligibility in regions close to a university	-0.365*** (0.108)	-0.321** (0.136)		
Tertiary eligibility far in regions far from a university	-0.127 (0.0964)	-0.166 (0.112)		
Tertiary eligibility in urban areas			-0.280*** (0.104)	-0.239* (0.123)
Tertiary eligibility in rural areas			-0.238*** (0.0838)	-0.257*** (0.0932)
Observations	3,695	3,695	3,695	3,695
R-squared	0.567	0.627	0.567	0.626
Number of mun	287	287	287	287

Notes: The dependent variables are the logarithmic numbers of crime per 100,000 inhabitants. Year and municipality fixed effects, the share finishing upper-secondary education, the student population, the tertiary beginners and the demographical covariates in Table 2 are added in every specification. The models are weighted with population size. Robust clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. TSLS estimation of tertiary eligibility effect on crime.

	Municipalities close to a university		Municipalities distant to a university	
	Property crimes	Violent crimes	Property crimes	Violent crimes
Local average partial effect of the association between university beginners and tertiary eligibility	-0.308*** (0.0936)	-0.362*** (0.107)	-3.222 (3.597)	-0.739 (1.754)
Weak IV-test (Kleibergen-Paap F statistic)	31.272	31.272	0.820	0.820
Observations	2,272	2,272	1,414	1,414
Number of mun	176	176	111	111

Notes: The second-stage dependent variables are the logarithmic numbers of crime per 100,000 inhabitants. The first-stage dependent variable is the share of tertiary beginners and the instrument in the tertiary eligibility rate. Year and municipality fixed effects, the share finishing upper-secondary education, the student population and the demographical covariates in Table 2 are added in every specification. The models are weighted with population size. Robust clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A1. Descriptive statistics.

	Mean	Std. Err.	Between	Within	N	Source
Ln Property crimes (per 100.000 population)	8.196	0.359	0.299	0.198	3696	The Nat. Council for Crime Prevention
Ln Violent crimes (per 100.000 population)	6.416	0.462	0.360	0.290	3696	The Nat. Council for Crime Prevention
Tertiary eligibility	0.870	0.058	0.033	0.048	3687	Statistics Sweden
Finishing upper-secondary education	0.720	0.071	0.051	0.050	3696	The Swedish National Agency for Education
Student population/Total population	0.013	0.002	0.001	0.001	3695	The Swedish National Agency for Education
Tertiary beginners	0.992	0.446	0.408	0.182	3695	Swedish higher education authority
Ln. Total pop.	9.840	0.903	0.907	0.030	3696	Statistics Sweden
Share of men (percent)	0.501	0.008	0.007	0.002	3696	Statistics Sweden
Share with a foreign background (percent)	0.115	0.070	0.069	0.014	3696	Statistics Sweden
Outflow (share)	0.048	0.012	0.011	0.004	3696	Statistics Sweden
Inflow (share)	0.049	0.014	0.013	0.005	3696	Statistics Sweden
Share 00-14 (percent)	17.571	2.184	1.846	1.176	3696	Statistics Sweden
Share 15-19 (percent)	6.708	0.753	0.479	0.583	3696	Statistics Sweden
Share 20-24 (percent)	5.077	1.096	1.015	0.412	3696	Statistics Sweden
Share 25-34 (percent)	10.678	2.188	1.962	0.969	3696	Statistics Sweden
Share 35-44 (percent)	13.328	1.312	1.217	0.497	3696	Statistics Sweden
Ln. of income	5.217	0.130	0.109	0.071	3696	Statistics Sweden
Total unemployment (percent)	5.762	2.382	1.888	1.452	3696	National Labour Market Board
Long-term unemployment (percent)	1.338	0.647	0.423	0.490	3696	Statistics Sweden
Youth unemployment	17.524	5.510	4.339	3.398	3696	Statistics Sweden
Ln. of exp. on education	9.435	0.130	0.099	0.084	3696	Statistics Sweden
Ln. of exp. on social aid	7.599	0.354	0.302	0.184	3696	Statistics Sweden
Ln. of exp. on culture and leisure	7.497	0.258	0.236	0.107	3696	Statistics Sweden
Alcohol consumption	4.988	4.389	4.110	1.637	3696	The Swe. Nat. Inst. of Public Health
Grades	13.641	0.899	0.750	0.602	2704	The Swedish National Agency for Education
Share in private schools	9.159	8.924	7.028	5.833	2704	The Swedish National Agency for Education
Foreign share at schools	11.684	8.165	8.258	2.459	2699	The Swedish National Agency for Education
Ln. Burglary	6.984	0.407	0.298	0.278	3696	The Nat. Council for Crime Prevention
Ln. Theft and pilfering	7.282	0.415	0.383	0.157	3696	The Nat. Council for Crime Prevention
Ln. Handling stolen property	3.340	0.737	0.420	0.602	3227	The Nat. Council for Crime Prevention
Ln. Theft from vehicles	6.850	0.517	0.369	0.362	3696	The Nat. Council for Crime Prevention
Ln. Assault	6.290	0.458	0.360	0.284	3696	The Nat. Council for Crime Prevention
Ln. Rape	3.170	0.744	0.338	0.666	3181	The Nat. Council for Crime Prevention
Ln. Robbery	3.439	0.813	0.657	0.466	3138	The Nat. Council for Crime Prevention
Ln. Alcohol or narcotics	5.672	1.021	0.707	0.745	3654	The Nat. Council for Crime Prevention

Table A2. Estimating the tertiary eligibility effect on specific crime categories.

	Property crimes				Violent crimes			Alcohol and narcotics crimes
	Burglary	Theft or pilfering	Handling stolen prop	Theft from vehicles	Assault	Rape	Robbery	
Tertiary eligibility	-0.280*	-0.261***	0.381	-0.312*	-0.279***	-0.576*	-0.246	0.0603
	(0.154)	(0.0718)	(0.315)	(0.169)	(0.100)	(0.346)	(0.259)	(0.285)
Finishing upper-sec. ed _t	-0.214***	-0.0436	0.157	-0.124*	-0.0834	0.133	-0.132	0.199
	(0.0579)	(0.0407)	(0.130)	(0.0636)	(0.0581)	(0.143)	(0.123)	(0.176)
Finishing upp.-sec. ed _{t-1}	0.0443	-0.0460	-0.645*	-0.127	-0.341***	-0.485*	-0.511**	-0.371
	(0.110)	(0.0680)	(0.341)	(0.120)	(0.0786)	(0.281)	(0.222)	(0.236)
Student pop./total pop.	-3.537	-4.037	-12.58	8.859	3.120	4.419	-8.922	-19.93*
	(5.609)	(3.049)	(13.57)	(7.591)	(3.834)	(12.30)	(11.40)	(11.61)
Tertiary beginners	-0.0860**	-0.0135	-0.0254	-0.0187	-0.0719***	-0.0870	-0.0354	-0.220***
	(0.0342)	(0.0193)	(0.0790)	(0.0658)	(0.0175)	(0.0692)	(0.0463)	(0.0395)
Observations	3,686	3,686	3,223	3,686	3,686	3,179	3,134	3,646
R-squared	0.449	0.104	0.183	0.697	0.584	0.486	0.105	0.616
Number of mun	287	287	287	287	287	287	285	287

Notes: The dependent variables are the logarithmic numbers of crime per 100,000 inhabitants. Year and municipality fixed effects and the demographical covariates in Table 2 are added in every specification. The models are weighted with population size. Robust clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.